

REMARKS

The Applicants appreciate the thoroughness with which the subject application has been examined. By this amendment, changes have been made in the drawings, specification and claims to overcome the Examiner's rejections and objections and more concisely claim and describe the present invention. Claims 1, 4, 5, 15 and 18 have been amended. The Examiner's allowance of all pending claims is earnestly solicited.

It is noted that the Office Action refers to pending claims 1-25. In fact claims 1-26 are pending in the Application.

MATTERS RELATED TO THE DRAWINGS

The Applicants hereby submit corrected versions of Figures 3 and 4 with the legend "Prior Art" added as required by the Examiner. See Attachment 1.

MATTERS RELATED TO THE SPECIFICATION

Examiner Lee has objected to the specification due to an informality in paragraph [0015]. This informality, and additional informalities in the same paragraph, have been corrected as set forth in the amended specification paragraph [0015] above.

MATTERS RELATED TO THE CLAIMS

The Examiner has rejected claims 1-6 and 10-13 under Section 102(a) as anticipated by Applicants' admitted prior art. Claims 7-9 and 14 have been rejected under Section 103 as unpatentable over the Applicants' admitted prior art in view of Chen (6,784,096).

To further define the invention over the cited prior art, the Applicants have amended claim 1 as set forth above in the marked-up version of the claim. In particular, the Applicants have amended the fourth claim step to, "controlling the wafer temperature within the temperature range in response to heat flow from the chuck to the wafer."

The Applicants' state in Background paragraph [0015], "Since the frictional forces of the impinging sputtered atoms can raise the wafer temperature above the chuck temperature, the gas cools the wafer 106 (referred to as backside cooling) as it flows between the wafer 106 and the chuck 126. With heat transfer from the gas, the chuck may also serve as a heat sink." Thus, it can be seen that according to the prior art, the chuck acts as a heat sink as heat flows from the

wafer to the chuck. The Applicants' further state in the same Background paragraph, "without backside cooling, the wafer temperature increases with time, approaching the plasma temperature."

As set forth in amended claim 1, the Applicants are controlling the wafer temperature in response to heat flow from the chuck to the wafer. The chuck does not act as a heat sink, but instead serves as a heat source. Clearly, with these changes, the Applicants' amended claim 1 is patentably distinct from the Applicants' discussion of the prior art clamped and electrostatic chucks.

Further, it is not seen how the Applicants' invention as set forth in amended claim 1 can be considered obvious in light of the prior art. The Applicants' invention teaches away from the conventional sputtering process where the sputtered atoms raise the wafer temperature above the chuck temperature and backside cooling is employed to reduce the wafer temperature in a direction toward the chuck temperature.

It is respectfully submitted that each of the rejected dependent claims 2-14, depending from amended independent claim 1, includes one or more elements that further distinguish the invention over the art of record. These claims should therefore be in condition for allowance. It is further noted that claim 3 has been amended to comport with the amendment to claim 1 from which it depends.

Dependent claim 5 has been amended to state the additional step of, "positioning the wafer at a distance from the target such that the wafer temperature exhibits a greater dependence on the chuck temperature than on other parameters associated with the method for depositing material on the semiconductor wafer." Support for this change can be found in paragraph [0030] of the application. Such a limitation is not present in the cited art. There is no reference in the Applicants' background discussion or other cited art that discloses or suggests that positioning the wafer at a distance from the target causes the wafer temperature to exhibit a greater dependence on the chuck temperature than on other parameters.

Claims 15-25 have been rejected under Section 103 as unpatentable over the Applicants' admitted prior art in view of Chen.

To further clarify and define the invention as set forth in independent claim 15, the Applicants' have amended the last paragraph to read, "a controller for controlling the chuck heater such that the wafer temperature is controlled within the temperature range in response to

heat flow from the chuck to the wafer.” Support for this change can be found in the Applicants’ paragraphs [0029] through [0032].

The combination of the Applicants’ background discussion and the Chen patent fails to disclose or suggest the Applicants’ invention as set forth in amended claim 15. Chen discloses that the, “substrate support 212 may be heated using an embedded heating element (not shown), such as a resistive heater, or may be heated using radiant heat, such as heating lamps (not shown) disposed above the substrate support 212.” Chen further discloses, “the controller 476 also may control the position and or temperature of the pedestal electrode 454.” But the Applicants’ background discussion and the Chen reference individually and their combination lack any disclosure or suggestion of, “a controller for controlling the chuck heater such that the wafer temperature is controlled within the temperature range in response to heat flow from the chuck to the wafer,” as set forth in Applicants’ amended claim 15.

Notwithstanding that the Chen reference does not disclose or suggest the Applicant’s invention, there is no disclosure for making the combination proposed by the Examiner, much less a disclosure as to specifically how the references could be combined. The Examiner’s reference to Chen as “analogous art,” and reliance thereon for making the combination does not satisfy the requirements for combining references. There must be some basis, motivation or suggestion in at least one of the cited references for making the proposed combination.

With respect to the dependent claims 16-26, depending directly or indirectly from amended independent claim 15, it is respectfully submitted that each of these dependent claims includes one or more elements that further distinguish the invention over the art of record. These claims should therefore be in condition for allowance.

Dependent claim 18 has been amended to more specifically define the invention as claimed therein over the prior art.

With regard to claims 14 and 19, as stated above, the Applicants’ respectfully submit that these claims are in condition for allowance due to their dependency from amended independent claims that are believed to be allowable. The Examiner states that with respect to claims 14 and 19, “the selection of the space between the target and the wafer is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species.”

In fact, the Applicants' state in paragraph [0030] that, "at a distance of about 45 millimeters, the heat generated by the plasma and by the frictional forces of the impinging deposition particles are not dominant heat sources for the wafer. Instead, the temperature is determined primarily by radiant heat flow from the chuck 150, as heated by chuck heaters 156 under control of a temperature controller 158." In fact, the Applicant's teachings yield these unexpected results, as according to the prior art the frictional forces of the impinging deposition particles are the dominant heat sources for the wafer 106, and this heat must be removed from the wafer using the chuck as a heat sink. Thus, the new and unexpected result according to the Applicants' invention is different in kind and not merely in degree from the results of the prior art. It is not therefore simply a matter of routine experimentation.

The Applicants have attempted to comply with all of the points raised in the Office Action and it is believed that the remaining claims in the application, i.e., claims 1-26, are now in condition for allowance. In view of the foregoing amendments and discussion, it is requested that the Examiner's claim rejections and objections have been overcome. It is respectfully requested that the Examiner reconsider these rejections and objections and issue a Notice of Allowance for all the claims pending in the application.

The Applicants hereby petition for an extension of time of one month to January 29, 2005, (January 29 being a Saturday and January 30 being a Sunday) under the provisions of 37 C.F.R. 1.136. An Authorization to Charge Credit Card Account for the \$120 extension fee is enclosed.

If a telephone conference will assist in clarifying or expediting this Amendment or the claim changes made herein, the Examiner is invited to contact the undersigned at the telephone number below.

Respectfully submitted,


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CERTIFICATE OF MAILING

I HEREBY CERTIFY that this Amendment (including Attachment 1) is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Mail Stop Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 31st day of January, 2005.



John L. DeAngelis



ATTACHMENT 1
REVISED FIGURES 3 AND 4